



CONTEST DESCRIPTION / DESCRIPTION DE CONCOURS

# REFRIGERATION AND AIR CONDITIONING

# REFRIGERATION ET CLIMATISATION

POST-SECONDARY /  
NIVEAU POSTSECONDAIRE

## Table of Contents

<b>1 THE ESSENTIAL SKILLS FOR CAREERS IN THE SKILLED TRADES AND TECHNOLOGY .....</b>	<b>3</b>
<b>2 CONTEST INTRODUCTION .....</b>	<b>3</b>
<b>3 CONTEST DESCRIPTION .....</b>	<b>4</b>
<b>4 EQUIPMENT, MATERIAL, CLOTHING .....</b>	<b>5</b>
<b>5 SAFETY REQUIREMENTS.....</b>	<b>6</b>
<b>6 ASSESSMENT .....</b>	<b>6</b>
<b>7 ADDITIONAL INFORMATION .....</b>	<b>6</b>
<b>8 NATIONAL TECHNICAL COMMITTEE MEMBERS .....</b>	<b>7</b>

## 1 THE ESSENTIAL SKILLS FOR CAREERS IN THE SKILLED TRADES AND TECHNOLOGY

SCC is currently working with Employment and Social Development Canada (ESDC) in order to bring awareness to the importance of Essential Skills that are absolutely crucial for success in the workforce. Part of this ongoing initiative requires the integration and identification of Essential Skills in contest descriptions, projects, and project documents. The next phase and very important aspect of our Essential Skills (ES) initiative is to provide an ES report card to each competitor at the Skills Canada National Competition. The purpose of the ES report card is to inform the competitor about their current level of essential skills based on their competition scores. With this knowledge, the competitor will be made aware which essential skill may require improvement. Full implementation is expected in the 2017 Skills Canada National Competition.

The following 9 skills have been identified and validated as key essential skills for the workplace in the legend below:

*<sup>1</sup>Numeracy, <sup>2</sup>Oral Communication, <sup>3</sup>Working with Others, <sup>4</sup>Continuous Learning, <sup>5</sup>Reading Text, <sup>6</sup>Writing, <sup>7</sup>Thinking, <sup>8</sup>Document Use, <sup>9</sup>Digital*

These essential skills have been identified with in section 2.4 and/or 3.2 of your Contest Description. The top three Essential Skills for your area of competition have been identified on your Project and all other supporting project documents.

## 2 CONTEST INTRODUCTION

### 2.1 Description of the associated work role(s) or occupation(s).

<http://skillscompetencescanada.com/en/careers/construction/refrigeration/>

### 2.2 Purpose of the Challenge.

To assess the contestant's skills relating to the installation, operation, maintenance and repair of mechanical and electrical components and equipment for a refrigeration and/or air Conditioning system.

### 2.3 Duration of contest.

13 hours

### 2.4 Skills and Knowledge to be tested.

The goal of the contest is to encourage students to learn more about refrigeration and air-conditioning.

Refrigerant handling is an important component, and contestants must be aware of current regulations.

### 3 CONTEST DESCRIPTION

**3.1** List of documents produced and timeline for when competitors have access to the documents.

DOCUMENT	DATE OF DISTRIBUTION VIA WEBSITE
No other documents will be released prior to the competition	

**3.2** Tasks that may be performed during the contest

- Applying basic and advanced control circuit concepts (electrical and, or electronic).
- From a provided electrical schematic, install electrical components and wiring to achieve provided sequence of operation.
- Diagnose electrical and mechanical fault(s) in an operating refrigeration and/or air conditioning system as required.<sup>7</sup>
- Calculate<sup>1</sup> and record required refrigerant charge and verify through subcooling and superheat measurement and calculations<sup>1</sup>
- Calculate<sup>1</sup> and record required settings for temperature and/or pressure controls
- Perform brazing procedures.
- Project: Install refrigeration tubing, mechanical components and indicated accessories, on a refrigeration system. Test, evacuate, charge and commission the system.
- Comply with all Provincial and Federal codes and regulations.
- Applying health and safety regulations.
- Pre-requisites :
  - Thorough knowledge of the refrigeration cycle.
  - The ability to use refrigeration tools and specialized equipment.
  - The ability to measure accurately<sup>1</sup> and use tools required for working with copper tubing.
  - Knowledge of and compliance with current industry codes and safety regulations.<sup>5</sup>
  - The ability to use precision electrical test equipment.
  - The ability to interpret electrical diagrams.
  - A good operating knowledge of typical controls used in refrigeration and air-conditioning systems. (To include: mechanical, electrical and electronic)

*Essential Skills – <sup>1</sup>Numeracy, <sup>5</sup>Reading Text, <sup>7</sup>Thinking (Problem Solving), <sup>8</sup>Document Use,*

## 4 EQUIPMENT, MATERIAL, CLOTHING

### 4.1 Equipment and material provided by Skills/Compétences Canada

- All consumables will be provided by the organization.
- HVAC Multimeter and Clamp Meter Combo Kit – Fluke model: 116/322
- Any additional required safety equipment, testing equipment or special tools will be supplied if not indicated on competitor tool list.

### 4.2 Equipment and material provided by the competitor

These are the only tools, which may be brought to the competition by the competitor. Should the competitor not bring any of the tools on the following list, SCC will not supply the tool(s).

- 1 – Set of common screwdrivers
- 1 – Control screwdriver
- 1 – Set of Phillips screwdrivers
- 1 – Set of Robertson screwdrivers
- 1 – Set of nut-drivers
- 1 – Set of combination wrenches  $\frac{1}{4}$  to  $\frac{15}{16}$  in.
- 1 – 6in, 8in, 10in and 12in adjustable wrench
- 1 – Linesman pliers
- 1 – Electrical side cutters
- 1 – Needle nose pliers
- 1 – Slip joint pliers
- 1 – Wire crimpers
- 1 – Wire Strippers
- 1 – Set of imperial and metric allen keys
- 1 – Combination ratchet valve wrench
- 1 – Flaring/swaging kit
- 1 - Hammer
- 1 – Tubing cutter  $\frac{1}{4}$  to  $1\frac{1}{8}$ in.
- 1 - File
- 1 – Tube reaming tool
- 1 – Mirror
- 1 - Flashlight
- 1 – Multimeter, minimum Cat III(Optional) (Meters are available)
- 1 – Clamp-on ampmeter, minimum CAT III (Meters are available))
- 1 – Thermometer (electronic or mechanical)
- 1 – Brazing blanket/heat shield
- 1 – Leak detector
- 1 – Tape measure
- 1 – Valve core tool
- 1 – Micron vacuum gauge and necessary connections
- 1 – Solenoid Magnet
- 1 – Nitrogen Flow/purging Regulator

- Electronic refrigerant scale
- 1 – Torpedo Level
- 1 – Utility knife
- 1 – Assortment of screwdriver bits ie: #2 robertson, # 2 phillips
- 1 – Set of Analog refrigeration manifold and gauges (complete with: environmental hoses in good condition)
- Pencils, pens, notepad
- Calculator

#### 4.3 Required clothing (Provided by competitor)

- Contestants must wear the appropriate clothing and standard safety gear (Long sleeve non-synthetic shirt for brazing) – Long pants

## 5 SAFETY REQUIREMENTS

### 5.1 Safety workshop

Upon arrival at the Skill area, Competitors will participate in a Safety workshop and they will be expected to work and maintain a safe working area during the competition. Any Competitor breaking any health, safety and environment rules, may be required to undertake a second safety workshop, this will not affect the Competitor's competition time.

### 5.2 List of required personal protective equipment (PPE) provided by competitors

- Clear Safety Glasses
- “Mechanics-style” work Gloves
- CSA approved Safety shoes
- All-Leather gloves for brazing

## 6 ASSESSMENT

### 6.1 Point breakdown

POINT BREAKDOWN	/100
Piping, Commissioning, and Electrical Controls	90
Trouble shooting & Safety	10

## 7 ADDITIONAL INFORMATION

### 7.1 Consecutive translation

If consecutive translation is required on site, the Skills/Competences Canada Provincial/Territorial offices must advise Skills/Compétences Canada National Secretariat a minimum of 1 month prior to the competition or this service might not be guaranteed.

### 7.2 Test Project change at the Competition

Where the Test Project has been circulated to Competitors in advance, NTC shall change a maximum of 30% of the work content. Please refer to the Competition Rules.

### 7.3 Tie (No ties are allowed)

In the event of a tie, the competitor with the highest score for Troubleshooting & Safety criteria shall be declared the winner, if a tie still exists, the competitor with the shortest time in troubleshooting shall be declared the winner.

### 7.4 Competition rules

Please refer to the competition rules of the Skills Canada National Competition.

## 8 NATIONAL TECHNICAL COMMITTEE MEMBERS

Member Organization	Name	Email address
British Columbia-	Matt Buss	
Manitoba - Chair	Dave McCutcheon	dmccutcheon@rrc.ca
Ontario	Shane McCarthy	
Québec	Didier Gaudron	
New Brunswick	Graydon Davidson	
Saskatchewan	Lee Blakely	
Prince Edward Island	Nick Green	
Alberta	Todd Matsuba	
Newfoundland and Labrador	Maurice Tarrant	
Nova Scotia	Brian Nicholl	